

DETACHABLE FLAT PANEL COMPUTER DISPLAY AND SUPPORT

BACKGROUND OF THE INVENTION

This invention relates generally to portable computers with flat panel displays, and more particularly, to a detachable flat panel display and support.

The personal computer and computer work station are popular computer system architectures available in many different configurations having any of several different processors (e.g., 80386, 80486, 586, PENTIUM™, PowerPC™, Alpha) and operating systems (e.g., DOS, Windows 95, Windows NT, UNIX, MAC-OS, OS/2). Different categories by case size, include desktop computer, laptop computer, notebook computer and palm-top or hand-held computer. The laptop, notebook, and palm-top or hand-held computers also are referred to as portable computers. The desktop computer typically includes a system unit, a display and a keyboard. The system unit includes the essential circuitry such as a motherboard with central processing unit, a power supply, and data storage devices (e.g., hard disk drive, floppy disk drive optical disk drive). For the desktop computer configuration the system unit, display and keyboard typically are physically distinct units.

A portable computer is a popular configuration enabling increased mobility for a user. Typically, the motherboard, display and keyboard are integrated into a common case in a portable configuration. The notebook computer typically has a display housing and a keyboard housing permanently attached via a hinged relationship. A flat panel display is mounted within the display housing. A keyboard, motherboard, data storage unit(s), expansion slot, and I/O port are mounted in the keyboard housing. A conventional notebook computer is approximately the size of a standard sheet of paper (e.g., 21.6 cm by 27.9 cm; or in English units—8.5 inches by 11.0 inches). The thickness of such a notebook computer typically is 4.5 cm to 6.0 cm.

One of the benefits of the notebook computer case is that the computer is readily transportable. To use the computer one simply unlatches the display housing from the keyboard housing, rotates the display housing into an open position, and turns on the computer. The integral nature of the display, keyboard and main circuitry allows for improved transportability.

One of the ergonomic shortcomings of a notebook computer case is that the user cannot define independent positions for the keyboard and the display. The same feature that improves transportability poses an ergonomic shortcoming. Specifically, with the display and keyboard fixed to the computer case, one can set the computer at a position comfortable for keyboard entry or comfortable for viewing, but typically not comfortable for both keyboard entry and viewing. For example, one can set the computer so that the distance between a user's wrists and upper body is comfortable for keyboard entry. A comfortable viewing position is to have the viewer's eyeline perpendicular to the display screen. Given the computer position, the user rotates the display to be perpendicular to the eyeline. To achieve such a viewing orientation, the display screen typically is angled relative to the computer base at 30° to 45°. Such angling, however, often results in glare which deteriorates the user's viewing ability. If the display is angled to avoid glare and have the display screen be oriented so as not be perpendicular to the eyeline, different colors and contrasts may be perceived between the top and bottom portions of the screen (e.g., for large LCD displays). Thus, viewing comfort is

compromised. Alternatively, one can position the computer at a comfortable distance and height for the eye. However, one's wrists then are at an uncomfortable position and the computer at an uncomfortable distance.

One solution to the shortcoming has been to provide additional ports to plug in a separate full size external keyboard or a separate CRT display. These solutions, however, are performed to enable one to use the notebook computer as one's full-time computer in the office. One does not lug around such a separate keyboard or display.

SUMMARY OF THE INVENTION

According to the invention, a notebook computer has a detachable display and stand. According to one aspect of the invention, the detachable display includes an integral support/stand for supporting the display apart from a main system unit of the notebook computer. According to an alternative aspect of the invention, a separate height adjustable stand is used to support the detached display.

The notebook computer includes a system unit and a display unit. The system unit houses the keyboard, central processing unit and mass storage device(s). The display unit is a detachable flat panel display unit foldable relative to the system unit between an open position for viewing the display panel and a closed position at which the display panel is held to the system unit. The display unit includes a display housing, a flat panel display and a support. The flat panel display is mounted to the display housing and defines a viewing plane. The support is hinged to the display housing and defines a support plane. The display unit rests upon the support when detached from the system unit. The display housing rotates relative to the support to define an adjustable angle between the viewing plane and the support plane.

According to an aspect of the invention, a structure for locking the display unit to the system unit is present. The display unit cannot be detached from the system unit while locked. The display unit, however, is operational and rotatable between the open position and closed position while locked. There is an indication of whether the display unit is locked or unlocked while attached to the system unit. In one configuration latches protrude beyond the sidewalls of the computer case clearly indicating that the display is not locked to the computer case. The display unit cannot achieve the closed position while the display unit is unlocked.

According to another aspect of the invention, a separate display stand is used with the detachable display. The display stand includes a base, a receiving portion at which the display unit attaches to the display stand, and an arm between the base and receiving portion. The base defines a support plane. The arm rotates relative to the support plane to define an adjustable height for viewing the display unit. A cable is included to maintain signal communication between the display unit and the system unit. The orientation of the display unit viewing plane is adjustable relative to the display stand.

One advantage of the invention is that a user can independently define positions for a notebook computer keyboard and display so as to improve ergonomic comfort, without compromising computer transportability. Another advantage is that a more convenient location of the display is achieved for giving presentations, while still be able to operate the computer. An advantage regarding the separate stand embodiment is that the user can adjust the viewing height of the detached display. These and other aspects and advantages of the invention will be better understood by